National GIS Plan

Geographic Information System

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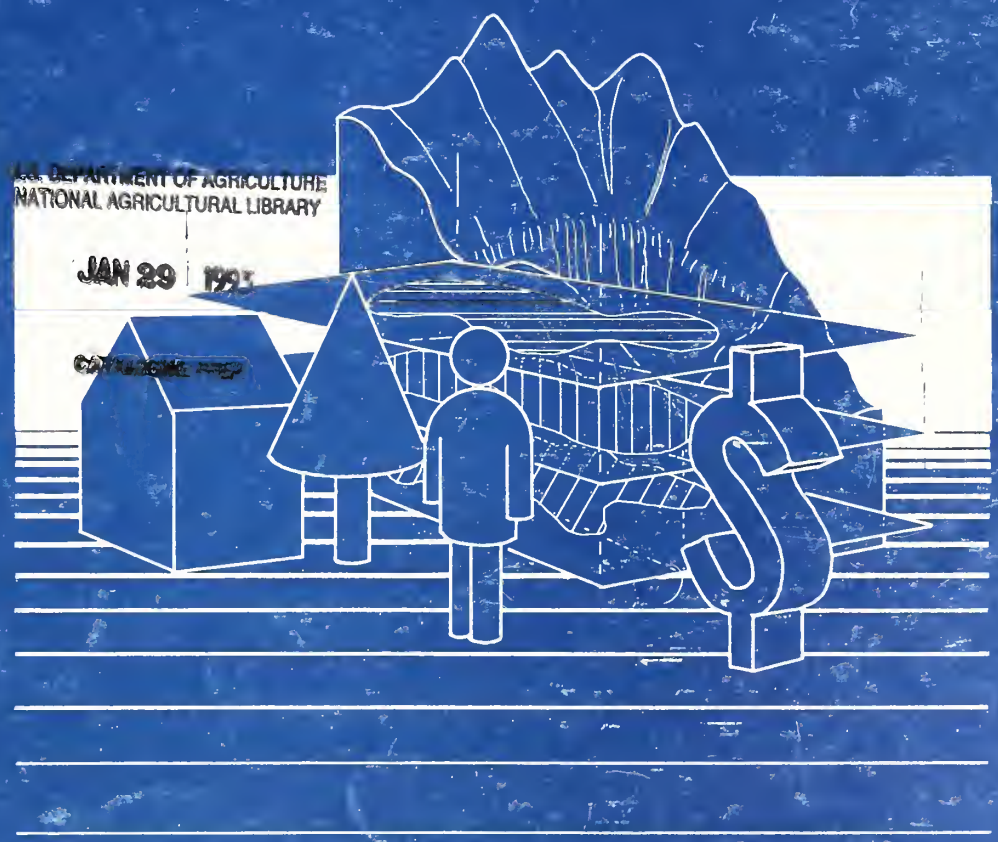
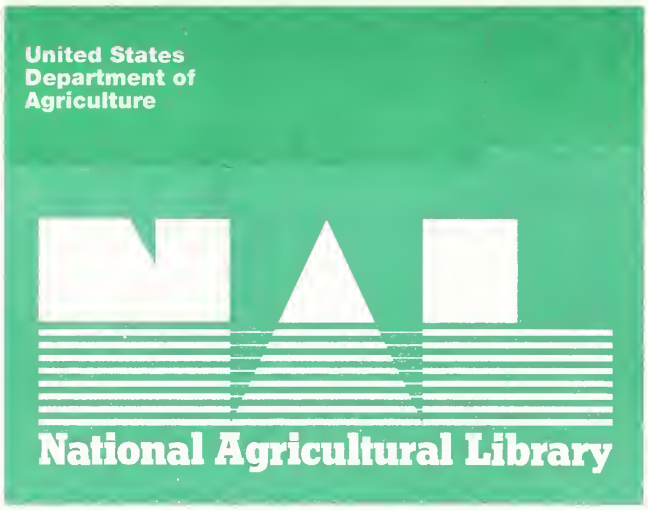
Washington, D.C.

May 1988

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Reply to: 1390 **Date:** MAY 02 1988

Subject: National GIS Plan

To: Regional Foresters, Station Directors, Area Director, and WO Staff

The National Geographic Information System (GIS) Plan is enclosed. The plan includes national objectives and principles, as well as action items and target dates for completion. It is intended to give perspective for your organization in preparing for a GIS.

The plan also alerts you to the need for your assistance and support; many action items will be impossible to complete without your help. Please expect to hear from us again with requests for help in specific areas.

Additionally, a detailed awareness package is being developed which will include brochures and an illustrated version of the National GIS Plan. These will be available soon.

Your experience in using a GIS as a tool to make improved resource decisions is invaluable to the successful implementation of a national GIS. This experience will be drawn upon extensively. Thank you for your continued cooperation and support.

Charles R Hartgraves

CHARLES R. HARTGRAVES
ASSOCIATE DEPUTY CHIEF

Enclosure

NATIONAL GIS PLAN

USDA FOREST SERVICE

NATIONAL GIS PLAN

CONTENTS

I. Introduction

As a federal agency with the responsibility for managing 200 million acres of land nationwide, the Forest Service needs to be responsive to a wide variety of public uses for this land and its many natural resources. Accordingly, the Forest Service mission is captured well in the expression **"Caring for the Land and Serving People"**.

To accomplish this mission, resource managers need to know "what" resources are available, and "where" they are located. Paper and mylar maps have traditionally been used to spatially locate resources. Increasingly, computerized graphical displays of locational resource information are being used in the workplace to help address the "where" considerations. The answers to the "what" questions have been hosted in a wide variety of data storage media such as paper records and reports, card files, microfiche, computerized databases, and professional/personal expertise.

The systems, media, and just as importantly, the terminology currently used by the Forest Service to describe "what" resources are available, and "where" they are located varies by region, forest, district, and functional area. However, it is becoming increasingly clear that the organization's vitality and ability to accomplish its mission depends on the rapid retrieval, analysis, and communication of information about the resources it manages.

Geographic Information System Technology

Geographic information system (GIS) technology is a tool to help facilitate the storage, retrieval, analysis and presentation of spatially related information about topographic features, boundaries, facilities, and resources. It can help the Forest Service achieve its mission through better resource information analysis and graphical display. Automated processes are available which provide the capability for relatively rapid input of data that has traditionally resided on maps and in various forms of data records. Once the data is entered, the functions of the GIS hardware and software technology allow the user to perform work in an automated electronic environment that used to be done primarily by laborious manual processes.

However, if GIS is to be anything more than just another technology placed in the hands of Forest Service employees, the agency must focus on the need to manage "corporate information". "Corporate information" is that information which needs to be commonly used, understood, and shared to meet the agency's mission. Accordingly, the Forest Service seeks to organize and describe corporate GIS data to facilitate the understanding and sharing of information about resources within the organization, as well as externally with other federal and state agencies, and with the publics which the agency serves. The term "corporate information structure" is sometimes used to refer to the commonly understood organization of data that facilitates the communication of management information.

It is the combination of GIS technology and shareable land-based data that will enable Forest Service managers at all levels of the organization to retrieve, analyze, display, and communicate management information about resources. It is the design, procurement, and implementation of this combination of GIS technology and a corporate information structure which constitute the National GIS Plan.

National GIS Plan Approved

On January 19, 1988, Chief and Staff approved a plan for implementing a Service-wide geographic information system by 1991. This paper describes the objectives and principles, components and action items, estimated timelines, key milestones, and the organizational roles and responsibilities for implementing the Forest Service National GIS Plan.

The policy establishing the organizational roles and responsibilities for implementing the National GIS Plan is contained in FSM 1390.3. The overall direction for Service-wide adoption and use of GIS rests with the Associate Deputy Chiefs of the Agency. Additional roles and responsibilities have been established to coordinate the activities associated with implementation of the National GIS Plan. These are presented in the Appendix.

II. Objectives and Principles

The primary objective of the National GIS Plan is to implement easy to use Service-wide technology which will facilitate the access, use, and sharing of management information about resources to help the Forest Service achieve its mission. The following principles provide a focus and some guidelines for accomplishing this objective:

1. The national GIS technology and information structure must support the management information needed by the Agency to accomplish its mission, including addressing issues and making decisions on all lands within the National Forest System, as well as facilitating activities within Research, and State and Private Forestry.

2. GIS data must be organized and described to facilitate understanding and sharing of management information both horizontally and vertically within the organization, and between other land management agencies and organizations where possible.

3. Forest Service managers must be able to easily access the GIS technology and the information it supports via a "non-technical, user-friendly" human interface.

4. GIS technology must take full advantage of the existing Forest Service computer processing and communications network.

5. GIS technology must be flexible enough to expand and incorporate new related technologies as they become available.

III. Components and Action Items

The National GIS Plan is comprised of five major components, or phases. These are:

1. Information Base and Structure.
2. Organizational Readiness.
3. Technology Procurement.
4. External Coordination and Oversight.
5. Implementation.

A significant effort will be required over the next two to three years to accomplish the objectives associated with the National GIS Plan. The Washington Office Information Systems (InS) and Computer Sciences and Telecommunications (CS&T) staffs will coordinate most of the tasks associated with these components. Both staffs will need to draw upon the skills and knowledge base that resides both within other functional areas of the organization, and externally within other agencies, to achieve a successful GIS acquisition and implementation that satisfies the resource management information needs of the organization. Many of the action items which comprise the components discussed below indicate that in addition to InS and/or CS&T coordination, detailers will be involved. The needed detailers will be drawn upon from all levels and functional areas of the organization as appropriate for the job at hand.

With that in mind, the following is a brief description of the components and their associated key action items, the output or result of each task, and the approximate target date for execution. The timings of the specific action items identified below are derived from our assumptions about what each task is, who needs to be involved, how long it will take, and how it interrelates to other tasks that need to be accomplished in order to achieve the objectives of the National GIS Plan. As we progress, our timelines may need to be revised as we complete some jobs, and learn more about the jobs that remain to be done.

A. Information Base and Structure Component

This component consists of two basic objectives. One is to capture the vision about how a National GIS and the information it supports will be implemented and integrated within the Forest Service. This includes identifying the known objectives, principles, and assumptions guiding the National GIS Plan. The second objective is to convert this vision and it's underlying principles into the GIS information structures, database environments, and "non-technical, user-friendly" human interfaces needed to achieve the objective of Service-wide accessible, useful, and shareable resource information.

InS will provide overall coordination for this component. The action items needed to achieve the objectives of this component are as follows:

1. **Capture the Vision, and Identify the Objectives, Principles, and Assumptions about the National GIS Implementation Plan:** This action item will involve testing and refining the proposed objectives, principles, and assumptions about the Service-wide implementation of GIS. It will also involve some "visioning", or the development of a "blueprint", to describe how the Forest Service can organize its GIS data (i.e., information structure) to facilitate the sharing of commonly understood information about resources. The results of this activity will serve as a focus and foundation from which to further develop, test, and refine the informational, technological, and organizational aspects of implementing the National GIS plan.

Who: InS, CS&T, and detailers

Activity: Several "think tank" meetings, and a white paper.

When: March through May, 1988

2. **Document the Resource Information Project (RIP)**: The Resource Information Project (RIP) surveyed 34 National Forests to investigate the kinds of data that are currently being used to describe resources. Two important ideas related to a GIS corporate information structure were validated from this effort. First is the distinction between "basic" and "interpreted" resource data. Basic data tends to represent the measurable, or observable, characteristics of a resource. Interpreted data, on the other hand, is usually derived information about resources based on calculations, manipulations, or professional judgments using basic data as input. The important point here is that "basic" data is relatively stable and is used as the foundation for deriving a wide variety of "interpreted" information about resources. Interpreted information, on the other hand, is more dynamic and a function of the information needed to address specific resource management tasks. The second concept that was validated through the RIP is that there is a relatively small core set of data attributes used to describe resources that is commonly used by most forests, although the codes and terminology used to communicate information about these attributes differs. These two ideas provide a framework to begin development of a corporate structure for resource information in GIS. This structure will initially focus on the basic data that is currently being used by most forests to describe and communicate management information about resources.

Who: InS and a detailer

Activity: Document the RIP findings in a report.

When: April and May, 1988

3. **Describe the GIS Corporate Information Structure and Database Environment**: "Corporate information" is that information which must be commonly used, understood, and shared to meet the agency's mission. "Information structure" refers to the framework for organizing, naming, defining, and coding data needed to facilitate the access, use, and communication of management information. The Forest Service seeks to organize and describe corporate GIS data to facilitate the understanding and sharing of information about resources within the organization, as well as externally with other federal and state agencies, and with the publics which the agency serves. This action item consists of testing, refining, and adding detail to the "blueprint" description of the Forest Service GIS corporate information structure. It also consists of describing the characteristics and functionality of the GIS database environment needed to support the information structure, and how GIS will be integrated within the existing Forest Service Information Architecture (FSIA).

Who: Detailers coordinated by InS and CS&T

Activity: Task group to produce a written structural description of the GIS information structure, data dictionary, and database environment.

When: June and July, 1988

4. **Identify the Corporate Data that will Support the Management Information Needs of the Forest Service**: GIS is a tool to help facilitate the storage, retrieval, analysis, and presentation of spatially related information about topographic features, boundaries, facilities, and resources. One of the principles underlying the National GIS Plan is that the Forest Service GIS information structure will contain the corporate data needed to support identified management information used to make resource management decisions. The Resource Information Project (RIP) took a significant step towards identifying the basic data about natural resources that is currently being used at the forest level. This action item will involve developing the resource attribute codes and definitions for a core set of corporate basic data that will facilitate communication of commonly understood information about resources. Similar efforts will also need to take place to develop the attribute codes and definitions for the core set of corporate data about topographic features, boundaries, and facilities.

Who: Detailers coordinated by InS

Activity: Develop and document codes, definitions, and standards for a core set of corporate basic data attributes, and describe how this data will be incorporated into the GIS information structure and database environment.

When: Initial task group in July and August, 1988, followed by several other task group efforts starting in the fall of 1988 and continuing through the winter, 1989.

5. **Define the requirements for a "Non-technical, User-Friendly" Interface to the GIS/FSIA Environment**: One of the key characteristics and principles underlying the plan to implement a Service-wide GIS is that the technology and information must be easily accessible to non-technical resource managers. Existing available GIS technology appears to be functionally adequate, but not "user friendly", or easily incorporated into the existing Forest Service Information Architecture (FSIA). This action item involves describing the requirements for the "non-technical, user-friendly" GIS/FSIA environment.

Who: Detailers coordinated by InS

Activity: Describe the characteristics and functional requirements for the "non-technical, user-friendly" FSIA interface to the GIS technology and information structure.

When: June and July, 1988

6. **Experiment, Test, and Evaluate Proposed Principles, Information Structures, Database Environments, and GIS/FSIA Interfaces**: The Forest Service will take advantage of opportunities to experiment with, test and evaluate proposed resource information structures, database environments, and GIS/FSIA human interface designs in applied GIS situations. Evaluation feedback will be used to refine our principles, assumptions, and functional specifications for the Service-wide GIS before proceeding into the contract procurement phase.

Who: Selected GIS sites coordinated by InS and CS&T

Activity: Experiment with, evaluate, and document test implementations of proposed GIS information structures, database environments, and user-friendly interfaces.

When: 1988 through 1990

B. Organizational Readiness Component

This component consists of two basic objectives. One is to promote Service-wide awareness and understanding of the objectives and principles associated with the National GIS Plan. The second objective is to facilitate and provide whatever guidance we can at the Washington Office level to help the field plan and prepare for implementing this technology and its associated information structure.

InS will coordinate the overall efforts associated with the Organizational Readiness Component. Some of the key tasks involved are identified below:

1. **Improving Awareness of the National GIS Plan**: There currently exists a lack of awareness and common understanding about the objectives, principles, and organizational initiatives associated with implementing the National GIS Plan. One result of this is a wide range of expectations about what GIS is and how it will be integrated into the Forest Service. Many users and potential users tend to understand primarily their own immediate needs for GIS technology. There is a need to cultivate awareness and understanding of the principles and objectives associated with implementing a Service-wide GIS and the related corporate information structure that this technology will support.

Who: Coordinated by the InS and PAO staff

Activity: Media will include presentations, brochures, briefing papers, and perhaps a video.

When: Ongoing throughout 1988-89

2. **GIS Implementation Planning Guidelines**: All field units should go through a planning process to help them prepare for a multi-year GIS implementation. This process can take on a wide range of intensities from very comprehensive to very general. Based on what has been learned from the Tomlinson Studies, the Controlled Evaluation Project, and other ongoing Forest Service GIS initiatives, we will develop a set of guidelines intended to help field units focus on the key issues, and alleviate some of the rigor as they go through their own local GIS implementation planning and preparation processes.

Who: Detailers coordinated by InS

Activity: Task group development of GIS Implementation Planning Guidelines.

When: September and October, 1988

3. **Develop a Strategy and Guidelines for Converting Existing Data, and Acquiring Additional Data Needed to Implement a National GIS**: The Forest Service has a great deal of investment in many different types of resource data that have been utilized to support program management for years. The formats of the resource data that have been used vary between regions, forests, districts, and functional areas. It is appropriate that the data which supports our management information needs be converted to a format which will be usable by whatever new GIS technology the agency acquires.

The Geometronics Service Center (GSC), and agencies outside of the Forest Service such as the Soil Conservation Service (SCS), the U.S. Geological Survey (USGS), the Bureau of Land Management (BLM), and other federal, state, and regional organizations are also potential sources of data which may be of value in the Service-wide GIS environment. A significant aspect of the National GIS Plan consists of the coordination between these agencies, and the development of strategies to share and exchange data where appropriate.

Relevancy, accuracy, consistency, and costs are some of the data related issues that need to be considered. It is estimated that data collection and entry represent 75 percent of the costs associated with implementing a GIS. Therefore, it is important that strategies and guidelines are developed to help the organization move towards a desired data readiness condition in an efficient manner. Some of this strategizing is appropriate at the local level. However, it is also likely that some dollar savings and Service-wide objectives could be realized by coordinating and developing these strategies at the Regional or National level.

Who: InS, CS&T, WO-Eng, and detailers

Activity: Develop recommendations and strategies.

When: January through April, 1989

4. **Formalize the National GIS Policy in the Manual**: This action item involves formalizing the current interim manual direction.

Who: InS

Activity Develop the FSM white pages for GIS.

When: December, 1989

C. Technology Procurement Component

The current target date for contract award for a Service-wide GIS is January, 1991. Several procurement related steps must be accomplished to meet this date. One of the key milestones is getting the required technical approval request documents to the Department by spring, 1989. Once technical approval is received, a multi-year sequence of action items leading up to a contract award must be implemented.

This component represents a significant organization-wide effort over the coming year. CS&T will coordinate overall accomplishment of the Technology Procurement Component. Some of the key action items that contribute to this component are:

1. **Documentation of the Functional Requirements**: Some of the documentation that needs to accompany the Request for Technical Approval consists of a description of the functional requirements for the GIS software, the "non-technical, user-friendly" human interface, and the hosting hardware.

   Who: CS&T, InS, and detailers

   Activity: Develop and document both the software & hardware functional requirements for the proposed Service-wide GIS.

   When: April through September, 1988

2. **Documenting the Feasibility Study**: The Feasibility Study is another document which must be submitted along with the Request for Technical Approval. The Federal Information Processing Standards Publication (FIPS PUB 64) presents an outline for this document. It consists of identifying the system objectives and technical requirements, describing and evaluating the existing, proposed and alternative systems, and developing a rationale for recommendation.

   Who: CS&T, InS, and detailers

   Activity: Develop and write the required sections of the Feasibility Study document.

   When: April, 1988 through February, 1989

3. **Documentation of the Cost/Benefit Analysis**: The Cost/Benefit Analysis is another document which must accompany the Request for Technical Approval. Again, the Federal Information Processing Standards Publication (FIPS PUB 64) outlines this document which discusses the cost/benefit analysis performed on the alternatives considered.

   Who: CS&T, InS, and detailers

   Activity: Perform the analysis and write the C/B Analysis document.

   When: August, 1988 through January, 1989

4. **Other Documents Needed to Submit Technical Approval Request**: Several documents will comprise the technical approval request package that will be submitted to the Department. The Functional Requirements, Feasibility Study, and Cost/Benefit Documents will impact CS&T and InS the most, but the other related documents that must accompany the request for technical approval also represent a significant work effort.

Who: CS&T, InS, Contracting, and detailers

Activity: Complete several required technical approval request documents.

When: On-going from April, 1988 through March, 1989

5. **Activities Associated with Issuing a Request for Proposals (RFP) and Awarding a Contract**: Once technical approval is received from the Department, several other action items must be accomplished before a contract can be awarded. Some of these activities include packaging the RFP, publishing the notice in the Commerce Business Daily (CBD), evaluating proposals, benchmarking, negotiating for best and final offers, preparing the documents, and awarding the contract.

Who: CS&T, InS, and Contracting

Activity: All the procurement steps required from time of receiving technical approval to contract award.

When: If Technical Approval is received by May, 1989, the projected dates for contract award range from June, 1990 at the earliest, to January, 1991 at the latest.

D. External Coordination and Oversight

The use of GIS technology is increasing rapidly throughout the Nation. Many federal, state, and local public agencies are planning large investments in GIS technology and data to help them achieve their missions more effectively. A key part of the National GIS Plan will be interagency coordination and the oversight of planned expenditures related to GIS.

Interagency coordination for GIS activities will focus on those agencies with natural resource management missions -- the US Geological Survey, the Bureau of Land Management, the National Park Service, the Fish and Wildlife Service, and the Soil Conservation Service. Other agencies, primarily through the Federal Interagency Coordinating Committee on Digital Cartography (FICCDC), will be conferred with as required. The main thrust of this coordination will be for data collection and exchange initiatives among Federal and State agencies.

Oversight activities will focus on requirements primarily from the Department, GSA, OMB, and the specific Appropriation Subcommittees of Congress.

Many of these coordination and oversight activities are already taking place. The "Interagency Agreement Related To Classifications and Inventories of Natural Resources" has enabled close coordination with the appropriate agencies in the Departments of Agriculture and Interior. Several GIS briefings, including those for the OMB, USDA's Assistant Secretary and Director of Information Resource Management, the Congressional Research Service, and congressional appropriation subcommittees have

enabled external contacts to comment on the Forest Service's proposed direction in the management of its land-based information.

Who: The Direction Team for the National GIS Plan

Activity: Project oversight, information sharing, and inter-agency cooperative agreements.

When: On-going throughout all stages of implementing a Service-wide GIS

E. Implementation

The predominant use of GIS applications in the Forest Service will be at the field level of the National Forest System, Research, and State and Private Forestry. Action items which comprise the Implementation Component include training of managers and users, installation of the GIS hardware and software, and data acquisition and entry.

1. **Training of Managers and Users**: Training is a significant element of the GIS implementation process. A key principle of the National GIS Plan is that the technology and the information structure it supports will be easily accessible to Forest Service managers whose computer skills range from basic to advanced. This will require that appropriate training be provided to line and staff officers, as well as resource specialists, technical GIS coordinators, and systems support staff. Some of this training should be about geographic information systems in general so as to increase the organization's overall awareness of this technology and how it can be used to help accomplish our mission. This should be provided in conjunction with the field's GIS implementation planning efforts. Once a contract is awarded, training on the specific GIS technology and information structure needs to be provided in conjunction with the installation and implementation of the Service-wide GIS.

Who: Coordinated WO, regional, and field level efforts

Activity: "Generic" and system specific GIS training to line and staff officers, as well as to resource specialists and technical systems support staff.

When: Starting now and on-going throughout Service-wide installation and implementation phase

2. **Data Acquisition, Conversion, and Entry**: It is estimated that 75 percent of the cost of procuring and implementing GIS is associated with data acquisition, conversion, and entry. This action item will consist of many different initiatives that should begin as soon as the needed data requirements are identified, and some overall strategies for proceeding are developed. These initiatives will range from national, to regional, to local in scope. Their completion should be appropriately prioritized and coordinated with the anticipated installation and implementation of the national GIS.

Who: Coordinated WO, regional, and field level efforts

Activity: Conversion of existing data, acquisition of additional data, and data entry.

When: Starting in 1989 and continuing through the implementation phase

3. **Installation of GIS Hardware and Software**: This action item consists of installing the GIS hardware and software at appropriate Forest Service sites throughout the National Forest System, Research, and State and Private Forestry.

Who: Coordinated CS&T, regional, and field level efforts

Activity: Order, deliver, and install GIS hardware and software.

When: Following contract award in 1991 and continuing through 1995

IV. Estimated Timeline for Implementing Key Action Items

The following are approximate target dates for the completion of some key milestone action items. They are intended to provide a general time frame for the implementation of the National GIS Plan.

Item No.	Key Milestone/Action Item	Estimated Target Date
1.	Develop Plan, Action Items, Roles, and Estimated Timeline	4/88
2.	Refine Vision, Principles and Assumptions for Nat'l GIS	5/88
3.	Describe Information Structure and Database Environment	6/88
4.	Initiate Development of GIS Resource Information Structure	8/88
5.	Issue Request for Information (RFI)	9/88
6.	Distribute GIS Planning Guidelines for the Field	10/88
7.	Conclude the RFI Process	12/88
8.	Initiate Development of Data Conversion & Acquisition Strategy	1/89
9.	Send Technical Approval Request to Department	3/89
10.	Technical Approval Received from Department	4/89
11.	Publish Request for Proposals (RFP)	6/89
12.	Closing Date for Responses to RFP	10/89
13.	Complete Technical Evaluation of RFP Responses	12/89
14.	Complete Benchmarking	4/90
15.	Complete Negotiations for Best and Final Offer	5/90
16.	Earliest Projected Date for Contract Award	6/90
17.	Latest Projected Date for Contract Award	1/91

APPENDIX

National GIS Plan: Organizational Roles and Responsibilities
(National and Regional Levels)

National Level Organization	Roles and Responsibilities
Associate Deputy Chief for Administration (Systems) in consultation with all Associate Deputy Chiefs	Provide direction for Service-wide adoption and use of Geographic Information Systems (GIS).
Staff Director,Information Systems (InS)	Overall leadership for developing and coordinating the implementation of the National GIS Plan. Leadership for the Information Base & Structure, and Organizational Readiness Components of the National GIS Plan.
Staff Director,Computer Sciences and Telecommunications (CS&T)	Leadership for the Technology Procurement, and Implementation Components of the National GIS Plan.
National GIS Steering Committee	Management guidance to monitor, evaluate, and recommend ways to use GIS technologies, and to help communicate a national direction for GIS.
Direction Team, National GIS Implementation	Guidance, oversight, and monitoring of work required to successfully implement the National GIS Plan. Leadership for the External Coordination and Oversight Component of the National GIS Plan.
Project Coordinators	Develop and carry out the components & associated action items required to implement the National GIS Plan. Report progress to Direction Team.

Regional Level Organization	Roles and Responsibilities
Regional Forester and Staff	Leadership and coordination for the development and implementation of regional policies and FSM Supplements related to GIS.